

LONG
ISLAND
SINCLAIR
TIMEX GROUP

L.I.S.T.ING

March
1985

Issue Price \$1.50

MEETING NOTES - FEBRUARY 3, 1985

The February '85 meeting of LIST was called to order at 2:30 PM at H. Werthauer's in Seaford. There were some 20 people in attendance. Topics discussed included:

1. Sec'y Treasures report:

- a) As of 2/3/85 we have 46 members, paid up (about 11 more old members are projected to renew as well).
- b) The current treasury balance stands at \$493.00.
- c) Income for 1984 was \$997.00, including liabilities, we anticipate a carryover to 1985 of \$60.00.

2. Newsletters: We currently exchange with 12 other groups (Listed inside).

3. Library Tape #2.2 was distributed. Please note that due to an error in record keeping, some TS 1000 members may receive the 2068 tape. If you are in this group, please simply mail it on. The TS 1000 tape will be mailed to the first group by 2/12/85. The library has received 8 books from McGraw Hill and one from Scott Foresmen (see inside).

4. Correspondence - LIST is receiving about 1 inquiry per day, every day and at least one flyer, per day.

5. The LIST DATA BASE will be regenerated.

6. LICA membership was discussed again. If we join LICA, they will publish our newsletter as part of theirs. LICA would collect all dues as well. Again, the membership voted to hold this matter in abeyance. The consensus was, that there was no significant benefit to our joining LICA, at this time. See recent issues of the STACK, for terms of association with LICA.

7. Officers for 1985 were elected: These are:

President - (pro tem)	Nazir Pashtoon
Sec'y Treas. -	Paul Donnelly
Librarian -	Chuck Russell
Corresponding Sec'y -	Jeff Street
Newsletter Editor -	Paul Donnelly
Assistant " -	Heinz Henken
Constitutional Committee -	Peter Ross
D-Base Manager -	Cem Barut
Education Coordinator -	Steve Kaye
Public Relations -	Vacant (any volunteers)

8. A Resolution to accept Computer Trader Magazines "swap subscriptions" offer was made and passed.

9. NEXT MEETING:

March 10, 1985 - 2PM Harvey Rait's place - Valley Stream * April 14, 1985 2PM - Paul Donnelly's - Centerport. For the March meeting, Steve Kaye will again conduct an "Answer" session at 1PM.

10. The meeting was adjourned and followed by demonstrations and discussion as follows:

- a) CEM BARUT demoed his "super Computer", a TS 1000 based system which he has housed in a full size keyboard. His system includes monitor output with switchable video, 64 K RAM/ROM with 8K utility ROM (word processor, disassembler, etc.) in the 8-16 area, and a full complement of Oliger boards.
- b) Paul D. installed a Spectrum ROM in John McC's 2068, in under 5 minutes.
- c) Jeff Street demonstrated "Tech Draw" - the high-res "Mackintosh" - like technical drawing environment he has developed for Zebra's Touch tablet. The results were spectacular (see samples inside).
- d) Steve Kaye, in addition to fielding beginners questions in his tutorial session before the meeting, showed us what his "little 1000" could do. Steve has a superb slate of business and education programs which he uses to manage his workload, both in and out of the classroom.

LIST GROUP

P.O. BOX 438

CENTERPORT N.Y. 11721-0438

LISTing Policy:

Annual Dues.....\$16.00 Issue Price \$1.50 (includes P&P)

One "Sample" copy sent upon receipt of large SASE.

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L.I.S.T.ing is published monthly by LIST (Long Island Sinclair Timex) Group
a not-for-profit users group

Your reviews, programs, comments, hardware projects, etc., are eagerly
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Please note our new address - P.O. BOX 438, Centerport, N.Y. 11721-0438
Mail sent to the old address must be forwarded there and will take
longer to reach us.

NOTE: PARTIAL YEAR MEMBERSHIPS AVAILABLE

Normal membership year is Feb. through Jan. at cost of \$15.00.(US)
By keeping as many members as possible on that basis, we keep
our costs and chances of error down.

If you wish to begin subscribing later in the year, please sign
up for the end of this year and all of next.

We will accept partial years or different subscription runs,
on a limited basis (particularly from members outside the U.S.)
But, please be aware that, "addition to possible rate increases,
your "account" must be handled "by hand" and errors may occur.
International (EX Canada) subscribers will receive as many
issues as we can afford to mail.

CLASSIFIED ADS

Got something to sell or trade? Members
get a free one time insert~~ion~~ of up to 50
words. 10¢/word-otherwise (your photo ready
copy); 15¢/word-we compose.

SPECTRUM ROMs - \$19.95 (18.00 for List members) includes
P & P. LIST Associates, 10 Idle Day Drive, Centerport,
N.Y. 11721.

DK'Tronics Light Pen (for Spectrum - works on 2068 buss)
\$35.00 (includes P & P) LIST Associates, 10 Idle Day Drive,
Centerport, N.Y. 11721.

A NOTE ON: LIST ASSOCIATES.
LISTA is a cooperative buying
service. It is not an official
organ of LIST Group.

SPECIAL DISCOUNT COUPON

This coupon is worth \$3.00 off the
regular retail price of Spectrum ROM's
from LIST Associates.

Through a special purchase arrangement
and the use of surface mail, we can
offer this special discount through
April 1985. For LIST members, that's
\$15.00 for the ROM. For non-members
\$16.95. (P&P included)

POLICY ON CONTRIBUTED MATERIAL:

We are always looking for interesting articles, programs, reviews etc. to help
keep our members informed and entertained. Articles submitted for publication
are printed on the following basis:

1. You, the writer, maintain the full copyright and can
resell, lend or give away your work, as you wish.
2. We are granted the right to publish your material,
in the original issue in which it appears. Reprints
(e.g., to supply orders for back issues) will in-
clude your material as a part of its original issue.
We are not allowed to sell your material in any
other way, without your express written consent;

We can't (for now) pay you for your material, but
you will receive a copy of the issue in which it
is published, even if you're not a member. You
may get more than one issue and you will definitely
earn the respect and appreciation by your grateful
peers.

If you have a program or article about something
you've tried, please send it in. Our group interests
are so varied that I can almost certainly guarantee
that someone else can use your expertise to solve
his problem.

1985 MAR

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ERRATA

As the number of articles and the size of LIST has grown, it is
inevitable that errors of fact will arise. Please correct the following
errors in your back issues.

- 1) In the Nov. issue of LIST the Spectrum header reader should be disre-
garded. The complete Spectrum header reader as well as the TS2068
header reader is part of the utilities tape in the library.
- 2) In the Dec.-Jan. Special LIST issue it was incorrectly stated that
Softcon's Floating Point Basic Compiler does not run. It does work
beautifully with ENW-1.
- 3) In the Dec.-Jan. issue it was stated that the C Compiler bombs out.
The said package also bombed out on a 486 Spectrum. When the manufacturer
was contacted they shipped a corrected copy (air-mail) with apologies.
Further they recently provided (free) an upgrade. The package runs.
- 4) In the Feb. issue (P.8) a power supply schematic is shown. Please reverse
the direction of the four rectifiers in the diagram, in order to feed
the 7805 regulator with positive (ref. to ground) 7 to 11 volts.
- 5) On p.10 of Dec.-Jan. Special issue, the 74LS27 is incorrectly drawn,
showing it to be a dual 3-input NAND gate. It should be corrected to
3-input NOR gates. (Credit to John Olliger for pointing the error).
- 6) In the Feb. issue in the Micro Drive Update article, p.22, in the second
diagram the output of the 74LS155 is shown to be pin 8. Correct this
to read pin 9, as in the first diagram.
- 7) March '85 P.4 List of \$6 library - is incorrectly shown as J. Bell's. These items
are in Peter J's private library. The table was published here primarily so that you
could benefit from Peter's comments.

RESISTORS

From: Bob Howard

```

10 BORDER 1: PAPER 1: INK 7: CLS
12 POKE 23658.8
13 PRINT "ROEBUCK COMPUTER S"
16 PRINT : PRINT " (ZX COMPUTING DEC. JAN '85) : PRINT " CORRECTED & EXPAN
DED: PRINT " BY BOB HOWARD WA6DLI"
17 PRINT : PRINT
20 PRINT " RESISTOR COLOR CODE"
30 DIM AS(4,7): DIM SS(32)
40 PRINT AT 10,0:"PLEASE INPUT COLOR BAND NUMBER ""(IF NO FOURTH BAND ENTER
""BODY"")"
50 FOR N=1 TO 4
60 PRINT AT 10,31:N
70 INPUT AS(N)
80 IF AS(N)="" THEN GO TO 70
90 NEXT N
100 PRINT AT 10,0:SS
110 PRINT AT 10,0:"PLEASE WAIT"
120 GO SUB 1000
130 PRINT AT 10,0:SS
140 PRINT AT 10,10:H:" ";DS
150 PRINT AT 12,10:" AT ";CS(4):" * TOLERANCE"
155 PRINT AT 11,0:SS
160 PRINT AT 21,0:"PRESS A KEY"
170 IF INKEYS="" THEN GO TO 170
180 PRINT AT 10,0:SS:SS:SS
190 PRINT AT 21,0:SS
200 GO TO 30
1000 DIM BS(12,7)
1010 DIM CS(10,2)
1015 LET BS(1)="BLACK"
1020 LET BS(2)="BROWN"
1030 LET BS(3)="RED"
1040 LET BS(4)="ORANGE"
1050 LET BS(5)="YELLOW"
1060 LET BS(6)="GREEN"
1070 LET BS(7)="BLUE"
1080 LET BS(8)="PURPLE"
1090 LET BS(9)="GREY"
1100 LET BS(10)="WHITE"
1104 LET BS(11)="GOLD"
1106 LET BS(12)="SILVER"
1110 FOR F=1 TO 3
1120 FOR N=1 TO 12
1130 IF AS(F)=BS(N) THEN LET CS(F)= STRS (N-1)
1140 NEXT N
1150 NEXT F
1160 IF AS(4)="GOLD" THEN LET CS(4)= STRS 5
1170 IF AS(4)="SILVER" THEN LET CS(4)= STRS 10
1180 IF AS(4)="BODY" THEN LET CS(4)= STRS 20
1190 LET Q= VAL CS(1): LET L= VAL CS(2)
1192 LET QS= STRS Q: LET LS= STRS L
1193 LET HS=QS+LS
1194 LET H= VAL HS
1210 FOR F=1 TO VAL CS(3)
1220 LET H=H*10
1230 NEXT F
1234 IF VAL CS(3)=10 THEN LET H=H*10E-13
1235 IF VAL CS(3)=11 THEN LET H=H*10E-15
1240 IF H=1000 THEN GO TO 3000
1250 IF H >= 1000 AND H<1000000 THEN GO TO 3100
1260 IF H >= 1000000 THEN GO TO 3200
3000 LET DS="OHMS"
3010 RETURN
3100 LET DS="KILO OHMS."
3110 LET H=H/1000
3120 RETURN
3200 LET DS="MEGOHMS."
3210 LET H=H/1000000
3240 RETURN
9000 SAVE "RESISTORS" LINE 10

```

From The STACK (LICA):

Now Forming
 Lawyers User Group John P. Reali 681-0077
 Sanyo Herb Jaffe 868-7461
 Timex-Sinclair P. J. Donnelly
 Wang Needs Chairperson

L.I.C.A. MONTHLY MEETINGS

All meetings are held at the New York Institute of Technology, Old Westbury Campus. L.I.C.A. general meetings are on the third Friday evening at 8:00 in Room 508, Building 500.

The Long Island Computer Association, Inc. is open to everyone, amateur or professional with an interest in computers, computer applications, programming, or related subjects. Dues are \$12.00 per year which includes monthly issues of *THE STACK*.

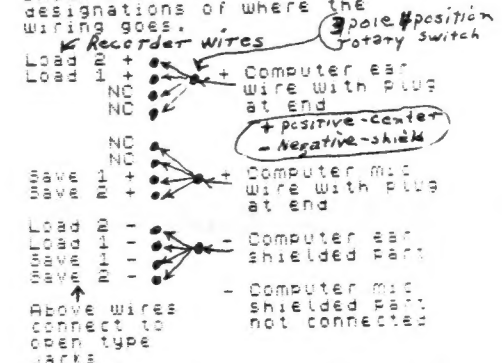
TWO RECORDERS

By now you have found a way to get fairly good saves and loads or have your computer on the shelf. If it is on the shelf then get it down and sell it to Marinus Heuseveldt so that he can blow a few more chips.

There are several things that can be done to get rid of pulling plugs, changing tapes, moving volume controls, eliminate ground loop problems etc.

I have found it very convenient to use two recorders that stay plugged in. One is used for saving and the other for loading. The volume controls remain set at best point for save/load. The SAVE recorder stays in record mode using the Pause control to stop/start it. The LOAD recorder stays in play mode also using pause control to start or stop it. A simple little "blackbox" takes care of all hook ups just by turning a switch knob. There are 4 settings for the switch control: Save on recorder 1, Save on recorder 2, Load from recorder 1, Load from recorder 2. The switch is a rotary 4 position 3 pole type.

The hook up is simple and shown below with minimum wiring shown in favor of written designations of where the wiring goes.



Note - placement in box is not important but keep unshielded parts of wires short.

This is a very handy system to make back ups as you go and also to use with data tapes.

I use a third recorder connected to the duplicating jack of a Winky 2000 that is connected in the ear line of the loading recorder and get a duplicate while the program is being loaded - Very Handy.

The Winky 2000 works with all Timex Computers and does a good filtering - duplicating job. In fact duplicates can be made without having the computer connected.

Go whole hog and use a filter in the recorder power line and also another filter in the computer line. Then plug the rest of your system in another outlet. This will give really good clean tapes as well as solve most of the T.V. display problems.
 Marinus Heuseveldt 963-1840

L_I_S_T GROUP

USER GROUPS - ZX/TS - "NEWSLETTER EXCHANGE"

Triangle Group
206 James Street 919-929-3079H
Carrboro, N.C. 27510 919-929-2106W

Silicon Valley S/T Users Group
Box 4133
Santa Clara, Ca 95054-0133

Capital/TSUG
PO Box 725
Bladensburg, Md 20710

Sinclair Computer Users Society
Box 36 or Box 523
Johnson City, N.Y. 13790 Owego 13827

CCAT/S
1419 1/2 7th Street
Oregon City, Or. 97045

TIMEX SINCLAIR USER GROUP
3708 Newberry Road
Gainesville, Fla. 32607

TSUG-MILEHIGH
914 South Victor Way
Aurora, Co. 80012

Abilene TSUG
609 E.N. 18th 673-3538
Abilene, Tex. 79601

QZX
1967 Defiance
Las Cruces, N.M. 88001

Central Pa TSUG
RD1 Box 539
Centre Hall, Pa. 16828

ZXTS Forum
40 New Era Real Estate
2304 S. Military Trail
Lake Worth, Fl. 33406

Toronto Timex-Sinclair Users Group
PO Box 7274 Stna.
Toronto, M5W 1X9, Canada

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PO Box F
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Fla. 32796

Computer Trader
Lambert Publishing
1704 Sam Drive
Birmingham, Ala. 35235

(Rick Duncan)
TS Horizons
2002 Summit Street
Portsmouth, Ohio 45662

Syncware News
9016 Flicker Place
Columbia, Md. 21045

Time Designs Magazine
29722 Hult Road
Colton, Or 97017

QTS
(WMJ Data Systems)
4 Butterfly Drive
Hauppauge, N.Y. 11788

Family Computing
730 Broadway
N.Y., N.Y. 10003

TS/ZX PUBLICATIONS

COMMENT

PRICE

The oldest remaining publication. \$48/yr
Back issues contain answers to
most of your questions. Starting
perhaps, to fall on hard times.
monthly?

A general interest monthly. This \$15/yr
is the place to look for Hwre & Swre
Bargains for any computer. Has a
TS column.

Somewhat like "Shopper" but more \$15/yr
"down home". Has a number of ZX/TS
articles - Monthly

Only a little over a year old, \$15/yr
TS Horizons gets better with each
issue (monthly).

Syncware News has a new "professional"
look and is another good choice for \$16.95
ZX/TS info (monthly) *yea*

Time Designs is new. The first issue
was a real lightweight effort in this
field. \$15/yr

QTS is a new Quarterly, the first issue
was light, too, almost bordering on a
catalog (like Syncware News and Arthur
Brown's letters)

Has a few TS programs to type \$19.97/yr
in. Beginners stuff for most
home computers

LIST OF SINCLAIR / TIMEX MAGAZINES IN LIBRARY

- 1 SYNTAX : EVERY ISSUE TO DATE (12/1983)
- 2 SYNC : VOL. 3, NO 3 THRU VOL. 4, NO 2 (4/1984)
- 3 K POWER: 2/1984, & 5/84 THRU 12/1984 (JUN84)
- 4 RAVELINES: VOL. 1, NO 2 THRU NO 5 (SEPT84)
- 5 POPULAR ELECTRONICS/ COMPUTERS & ELECTRONICS (10/82-7/84)
- 6 TIMEX SINCLAIR USER (NO 1 THRU 7) (JUN84)
- 7 ZX COMPUTING (4/84 TO DATE) (50/80)
- 8 YOUR SPECTRUM (ALL BAR NO 2) (800-4001)
- 9 PERSONAL COMPUTER WORLD (12/82 TO DATE) (UNIVERSAL)
- 10 THE BEST OF SINCLAIR PROGRAMS (8/8 1984) (7)
- 11 COMPUTER & VIDEO GAMES (5/84) (7)
- 12 SINCLAIR USER (5/84) (ON 8001)
- 13 16/48 (10/84) (1002)
- 14 FAMILY COMPUTING (FIRST ISSUES & 1/85) (STATIC)
- 15 RADIO-ELECTRONICS (12/84 TO DATE) (1681)

Peter G.

CATALOGS RECEIVED

G. RUSSELL ELECTRONICS
RD 1 Box 539
Centre Hall, Pa 16828

MAGNETA MEDIA OF NEW ENGLAND
PO BOX 780
Beverly, Ma. 01915

ZEBRA SYSTEM
78-06 Jamaica Avenue
Woodhaven, N.Y. 11421

PEOPLES SOFTWARE SUPPLY
609 E.N. 18th Street
Abelene, Tex. 79601

Pleasantrees Programming
PO Box 2034
Mesa, Az. 85204

D. LIPINSKI SCFTWARE
2737 Susquehanna Road
Roslyn, Pa. 19001

RAMEX
48945 Van Dyke Rd
Utica, Mi 48087

Takes Visa/MC
ROM Switch - \$54.95 complete
Winky ~~2000~~ \$21.95 + \$1.00

5-1/4" DSDD Disks less than
\$1.25 (includes P&P).

New Complete Catalog (48 pages),
available
New Graphics Tablet

Has 2068's - \$146
(no plastic)

Several popular HW & SW items and
their own ZX-81 programs (prices-
list or below)

Software - Business - takes Visa
MC. Has list of TS Vendors (over 120)
and software catalog over (300 titles)

Sells "reservations" for a disk drive
interface - \$200.00

LIST GROUP

BOOK REVIEW

TITLE: POWERFUL PROJECTS WITH YOUR TIMEX/SINCLAIR
BY: JIM STEPHANS
FROM: SCOTT, FORESMAN & CO., GLENVIEW, ILL.
PRICE: \$12.95 (ISBN: 0-673-18038-7)
COVERS: INTERFACING 2068 TO OUTSIDE WORLD

"At last!", I thought, as my trembling fingers quickly flipped through the pages of "Powerful Projects with your Timex/Sinclair", "a good basic hardware/interfacing manual with real projects". I saw breadboards, pictures of wire wrap tools, an Armatron robot, a number of good looking schematics, and hardware construction tips for several projects. Was this the ultimate 2068 interfacing book I had been looking for? Well, yes and no. Mostly yes, but there are a few parts of "PP" which put me off a bit.

Let's begin with a look at what's in "PP", Jim Stephan's book is 228 pages long, has 138 illustrations and is divided up into 7 Chapters:

Chapter One covers the 2068, the 280 instruction set and architecture, hexadecimal code and the use of IN and OUT instructions. That is a lot to cover in 36 pages; too much, in fact, but it does give you a good overview of those subjects.

In Chapter Two, Stephens discusses basic electronics components, design, breadboarding, wirewrapping and the construction of a motherboard to house your projects. He gives good examples, including photographs, schematics and line drawings in his narrative. This chapter is a must for novices and a refreshing review for the experienced kit builder.

Still following a very basic approach, Chapter 3 discusses the importance of fundamental skills (like soldering) and high school "electricity theory", before moving on to the construction of your own power supply. Stephens then gives a well illustrated guide to the backplane's (PC board) edge connector and the parts you'll need to make your own interface board. As you move through the chapter, you've asked to make measurements and interpret your results. You'll build a simple and inexpensive buffered I/O port and test it as you do.

Not content with simply lighting up LED's from BASIC, Chapter 4 provides construction plans for an optoisolated, triac driven, 3 outlet port which can run 110 volt appliances.

In Chapter 5, Microbotics are introduced, and a budget model robot, of sorts, is described in enough detail that most home craftsmen could build it. Moving on from there, Chapter 6 describes such other diverse projects (using the same Buffered I/O port) as a speech synthesizer, temperature sensor and A/D converter, among others. Schematics, chips, software, sources of supply, part numbers and good line drawings are provided for all the projects.

Chapter 7 is "what if" collection which wastes a couple of pages, though this is made up for, somewhat, by the TS1000/1500 conversions provided in the appendices.

I was impressed by most of what I read in "PP", though I found some errors, or omissions in a few of the chapters. These were annoying, but would probably not create any real problem, aside from a little confusion. The authors style is at once casual and parenthetical, while being forcefully reassuring. While I didn't care much for such expressions as having IC's "go to dreamland", the generally positive style can only help the novice to overcome his trepidations.

"PP" is an excellent book, for the level of interfacing (simple 8 bit I/O ports, partial decoding) which it supports, and can serve as a great first book for the novice. I rate it a 9 out of 10, though Mr. Stephens almost lost another point for "hype"; the picture of Radio Shack's "ARMATRON" was just that, a picture, with no more information than you could get from their catalog. I still can't figure out what purpose it would serve, short of snagging an unwary buyer in a book store. Still, at \$12.95, it's reasonable value for money, and right now, just about the "only game in town". (we'll report on other new releases as we find them).

Scott Foresman & Co.
1900 East Lake Avenue
Glenview, Ill 60025
(312) 729-3000

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P. DONNELLY

**The
Complete
Machine
Code
Tutor**

by
Malcolm Evans

List
Group

3/8

48K Spectrum

MICRO REVIEW

If you've got a "Spectrum", and want to learn MC programing, I highly recommend this suite of programs from New Generation. It's a well orchestrated hands-on tutorial on the subject and consists of a brief manual and two cassettes. List Associates can get it for about \$20.00 (P&P included) or by direct from U.K.

PJD

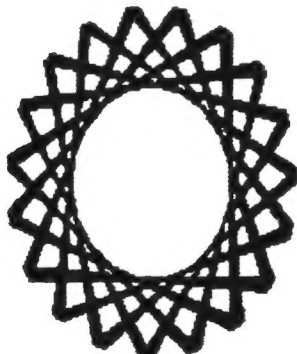
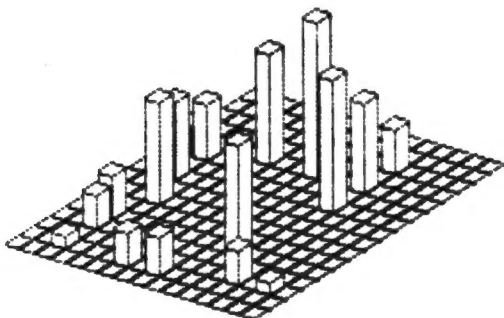
graphics

0/0

1989
SLAND
INCLUB
1988
Group



List
Group



JRC { P.O. BOX 448
SCOTTSDALE, IN 47178 }
SOFTWARE

TECH DRAW

ZEBRA SYSTEMS SOFTWARE
Copyright © 1985
for the
ZEBRA GRAPHIC TABLET

FONT MODE

NORMAL
ITALICS
BOLD

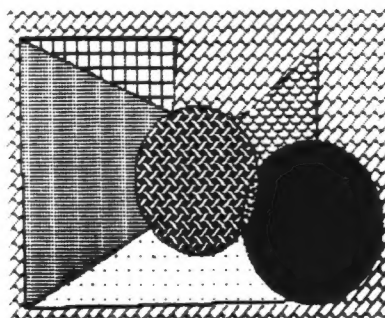
TEST

TEXT TYPE FONT FONT SAMPLE EXIT MENU
MODE WRITE MODE SIZE

BRUSH 5

face-2

LINE SHAD BRUSH VAN LINE CIRC UNDO IAL
REF PALE * BACK BORD TEXT LEO CL



communications

MACHINE CODE INTO MTERM (again)

Last month I wrote an article on loading machine code into the buffer area of MTERM. Everything was fine except that I forgot to mention that the POKES should be done twice. So here it is again!

As is, there is no way to load a machine code routine into the buffer of MTERM (unless it's in a REM statement). You can exit to BASIC and load a BASIC program, but how do you load a M/C routine to send to a friend?

The BASIC area in the computer which begins at 26710 is also the buffer area for MTERM. To simply say LOAD ""CODE 26710 will result in the error "Non-sense in BASIC". It may seem the code loaded in but when you call up MTERM you'll find that the BUFUSD=0.

Looking in the manual you'll find that the variables area is the next thing above the program area (page 254). On page 263 you will find two system variables PROG and VARS. PROG is a 2 byte system variable that contains the address of the first byte in the BASIC area.

TRY THIS:

```
PRINT PEEK 23635+256*PEEK 23638
This will give you 26710.
```

This is the address of the first byte in BASIC and the address of the first byte in the buffer of MTERM. To find the first byte of the variables area

TRY THIS:

```
PRINT PEEK 23627+256*PEEK 23628
```

This address will change as you add or delete lines from a BASIC program. The address that you come up with is also the address AFTER the last byte of the buffer. By POKEing VARS you can open the buffer (also the BASIC area) to hold your code. Once the buffer is open to the EXACT number of bytes you can now use LOAD ""CODE 26710.

As an example, to send a M/C routine that is 1000 bytes long you need to open the buffer by 1000 bytes. To do this, first add 1000 to 26710. This will give you 27710. This is the address that you need to POKE into VARS. Next divide 27710 by 256 (PRINT 27710/256) this will give you 108.24219. Write down 108 so you'll remember (this is the high part of the 2 byte number). Take the decimal remainder and multiply it by 256 (PRINT .24219*256), this will give you 62.00864. Write down 62, this is the low part of a 2 byte number. The computer stores 2 byte numbers low byte first, so to get this into VARS, do this.

We've lost the credits on this one, if you recognize it, please let us know who to thank. (Editor)

POKE 23627,62:POKE 23628,100

Call up MTERM and look at BUFUSD it won't be right. Exit to BASIC and make the POKES again.

POKE 23627,62:POKE 23628,100

Call up MTERM again and you will find that the buffer has been opened up by 1000 bytes. I have no idea why you have to make the POKES twice but it works every time. You can now use LOAD ""CODE 26710 to load in the 1000 byte routine.

Here is a summary of the steps to use.

1) Calculate the address to POKE into VARS by adding the number of bytes you need to 26710.

2) Calculate the high and low bytes as described above.

3) POKE the two numbers into VARS like this:

```
POKE 23627,lo:POKE 23628,hi
```

4) Call up MTERM.

```
PRINT VARS
```

5) Exit to BASIC.

6) POKE the two numbers into VARS again:

```
POKE 23627,lo:POKE 23628,hi
```

7) Call up MTERM and check BUFUSD.

8) Exit to BASIC

9) LOAD ""CODE 26710

To send a M/C program that is too big to fit in the buffer you can send it in two parts. As an example to send 30000 bytes which begin at 30000, LOAD it in as you would normally. SAVE it on a cassette in two parts like this:

```
SAVE "a" CODE 30000,15000
```

```
SAVE "b" CODE 45000,15000
```

Now you'll have the code split into two blocks and can send one block at a time.

The person on the receiving end, should SAVE the two blocks one after the other on the same tape. After receiving the first block, exit to BASIC and use this:

```
SAVE "a" CODE 26710,15000
```

After receiving the second block exit to BASIC and SAVE it after the first block like this again:

```
SAVE "b" CODE 26710,15000
```

Now to LOAD the code in use:

```
LOAD ""CODE 30000
```

```
LOAD ""CODE 45000
```

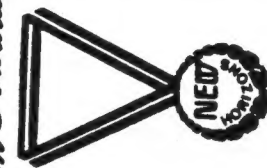
It's all in a kit

A kit consisting of the BASICODE handbook (with English translation) and an English-language cassette of translators for 17 popular or commonly-used computers (the ZX-81 is not one of them) is available (sent airmail) for 38,- (= Dutch guilders), payment in an international money order (IMO). The kit can be ordered from: BASICODE, Administratie Algemeen Secretariaat, NOS, P.O. Box 10, 1200 JB Hilversum, The Netherlands. Since the translators are updated periodically, information regarding the availability of specific translators should be addressed to: Jonathan Marks, Media Network, English Section, Radio Netherlands, P.O. Box 992, 1200 JG Hilversum, The

they can be received in this country via English language short-wave broadcasts at 0930-0395 UTC on 9590 and 6165 kHz, and at 0530-0625 UTC on 9715 and 6165 kHz

Computer Digest — FEBRUARY 1985

First Annual T-S-H Division Awards



Best USER GROUP/Best NEWSLETTER Awards
Triangle Sinclair User Group-Doug Dewey, Ed.
Capitol Area Timex Sinclair(C.A.T.S.)-Jules Gesang, Ed.
Bay Area Timex Sinclair User Groups/Timelinez
Best new user group/newsletter:
Long Island Timex Sinclair(L.I.S.T.)-Paul Donnelly, Ed.
Most promising new newsletter:
Phoenix User Group-Doug Gangi, Ed.
Best special-interest group/newsletter:
QZX

WALL STREET ON-LINE:

CALL OUR 300/1200 BAUD MODEM TELEPHONE # (212) 543-9033

3/85
7

LIST
BOX 438
CENTERPORT, N.Y. 11721-0438

210 University Village
Starkville, MS 39759
February 3, 1985

Dear Sirs:

I am currently working on a data acquisition system for my senior design project using the Timex-Sinclair 1500 computer. Adequate information on this computer has been difficult to obtain or, to understand since I have only recently begun to use a T/S for purposes other than simple BASIC programming. The following are areas in which any assistance you would offer would be appreciated.

It would be very convenient if the data collected could be (1) transferred to cassette tape in the field, brought in to be transferred to an IBM PC, and then to the mainframe or, (2) bring in the T/S every month or so, load the tapes with data into the T/S memory, and then upload onto the IBM. Currently, AERCO of Texas is in the process of developing a dual RS-232 serial interface for the T/S. It appears that through this interface option 2 will be feasible. I would appreciate any information or suggestions you would have. More details of the project are provided below.

Other problems I have encountered are lack of cassette control by the program, lack of an internal clock, and lack of a printer and a need for documentation on the manipulation of locations that can be POKEd. However, the low cost, size, programming features and low power consumption of the computer favor its use in some field applications. In this project, it was intended to be used to collect information about water flow levels using a rechargeable battery for power.

A potentiometer will be geared into a float that measures water level through a flume. The pot reading is converted to a digital signal by an (8+8) analog interface. The digital reading ranges from 0 to 255 and is converted to the equivalent depth of water and stored in an array.

The program reads the measurement at regular intervals. Since it is best to keep the field equipment to a minimum due to power requirements, a monitor and printer will not be used in the field. Instead, the INKEYs function will be used to stop the run, begin the save onto tape, and then resume sampling by using a procedure that allows the maximum amount of time required for all data to be transferred.

Since we have only one T/S available, it would be convenient to store the data on tape to be read into the IBM directly through its cassette port to save operator time. If necessary, the data may be uploaded from the T/S through the RS-232 by bringing in the computer on off days. Any suggestions would be useful. Thank you for your time!

Sincerely,
Joe Walker

I received a CONTRA-CREEVE
STAPLER KIT FROM:

THOMAS COMPUTER PRODUCTS
24-254 Washington Road
Marietta, GA 30067
(404) 426-6039

COST \$25.00 (THE CHEAPEST PLACE AROUND)

BOOKS WERE SENT, ONE WORK ON
A CREDIT CARD PHONE BOOK.
SHIPPED UPS. THE PRICE WAS RIGHT TOO.
THE CARD ITS OK TO PRINT THEIR
ADDRESS & PHONE IN THE NEWSLETTER.
I WOULD CALL TO VERIFY THE
ADDRESS THOUGH.

Joe Walker
21 Q University Village
Starkville, MS 39759

Dear Joe:

Your project sounds very interesting. Real world interfacing is a subject dear to the hearts of many of our members, myself included. I assume you've seen my article on LED output from TS computers in Syncware news, so you know of one way to monitor what's going on inside without needing a display.

Perhaps the following suggestions may also be of help.

- 1) Try using a Hunter Board. These can have battery backed up CMOS memory (usually 2K, but possibly 8) in the 8-16K area of RAM. Your program need only POKE the retrieved data into sequential memory locations while in the field. At the end of a run, the system can be powered down and brought into the lab with the "data" intact. Then, using upload software and your RS232 interface, it can be uploaded to your P.C.
- 2) Get a JK Audio 310, or Ener-Z, or Byte Back interface. The Byte Back has relays which can be used to turn your tape recorder on and off. JK Audio and Ener-Z need a simple buffered relay (from Radio Shack) added on, in order to do that job, but these latter two have an MSM 5832 real time clock (again battery backed up) on board. Ener-Z has a very nice A/D port as well as a Centronics printer port. Just about everything you need.
- 3) If you want to keep measuring in the field, you'll need another machine. I can get TS 1000's, with 16K RAM pack for \$50.00 here in N.Y. (my cost).
- 4) The cassette SAVE and LOAD Routines for the TS 1000 are beyond me, but not others. See recent issues of Computer Trader Magazine, and Check Computer & Electronics and Radio Electronics - one of those had a good description of the data bursts in '84, I believe. If you can dope these out, all you need do is write an 8088 ML routine for the P.C. to "read" TS 1000 tapes. FIRST LOADER, from Syntax, and others does "Clive Code" to ASC II conversion (for the TS2068) and might be a good guide (Feb. '84 I think).
- 5) Write your own Software Clock using the systems variable FRAMES. See my article in Syn tax (1983), or send a blank tape and \$1.00 (for postage) and I'll supply it. Calibration will be tricky, but you should get reasonable accuracy.

Hope these suggestions help. Keep us advised of your progress.

Very truly yours,

Paul Donnelly Sec'y-Treas.

Dear Paul:

Received your note and copy of List. Extend my subscription to cover the \$5 to such extent. Enclosed is an item that you may wish to doctor and use in your paper. It is simple enough to think that it is very easy to run a users group and forget about the non-technical low budget person. I have been experimenting to find low tech economical ways to extend our computers usefulness especially the 1000. Also it is nice to tap the Spectrum stuff but perhaps more effort could be spent to capitalize on the 2068's superiority. If you would be interested in more items of a rather simple nature I would be glad to send them to you. I do not know the make up of your group as to whether this type of thing would be of help to any member/reader or not. I find that a 1000-54K+XLDS+2 recorders + recorder switching system + 3rd recorder with a Winny 2000 in duplicating mode makes a simple economical setup that is hard to beat. Couple it to PC/File and you may like it more than a micro drive, etc. Of course the system includes a regular keyboard. I belong to the South Florida ZX-TS User Group and our group appreciates your group's work.

Sincerely,
Marinus U. Heuseveldt

LETTERS TO LIST

DEAR ROM PEOPLE,

I WOULD LIKE TO ORDER A SPECTRUM ROM BUT HAVE A FEW QUESTIONS

- ① ARE THEY REALLY SPECTRUM ROMS?
YES, REAL ROM'S, NOT NEC GARS.
 - ② WHAT KIND OF DOCUMENTATION DO THEY COME WITH. UNFORTUNATELY - NONE. YOUR TRAY MANUAL IS VALID - EXCEPT THAT THERE ARE ANOTHER 50 OR SO TYPES BETWEEN SYSTEM MANIPULATIONS & THE START OF BASIC IN THE 2068 PROGRAMS.
 - ③ WILL THEY RUN 2068 PROGRAMS WITH NO "SOUND" OR "PEEK & POKE" COMMANDS? "FREE" ALSO WON'T WORK, NOR WILL STICK COMMANDS. (THO YOU CAN SIMULATE THIS USING AN IN COMMAND TO THE SYSTEM. OTHERWISE BASIC PROGRAMS WILL RUN. AL - DIFFERENT OPERATIONS WHETHER ALL BASIC PROGRAMS ALSO - OR NOT ROMS BOTH ARE MADE.)
- CAN YOU GIVE ME ANY INFORMATION ON THE (SURPLUS OR AQUARIUS) MATTEL ELECTRONICS MENTIONED IN A NOT VERY LEGIBLE "LETTER TO LIST" (THE MOOSE) SOUNDS VERY INTERESTING. ODD LOT - (IN THIS CASE) WAS SELLING THEM FOR \$10.00 REMEMBER, YOU NEED MC SOFTWARE TO MAKE IT WORK. I HAVE A SAREE THANKS FOR ANY HELP YOU CAN GIVE ME!

John 2/21

Hope This answers your questions John

West Covina, Ca. 91790
January 28, 1985

Dear Paul,

Here are two articles from the most recent Radio-Electronics which I find fascinating.

The "Streamer" in addition to being an inexpensive alternative to a disk drive or stringy-floppy has the additional advantage of offering portability between computers at least at a listing level, I guess.

The Dutch broadcasting scheme is also of interest in a similar way and their system might be usable on the DX ham bands if enough hams had a translator program. Will have to find out if the "Spectrum" (2068) is supported. Article says ZX-81 is not and that is surprising as the ZX-81 is the most numerous computer in Europe or perhaps elsewhere. I listened in to the 6165 KHz frequency and Holland came in fine at 0230 UTC but no program for computerists on Sunday, anyway.

Anyway I intend to build one of the streamers as soon as possible as I am already equipped with the TASMAN RS-232c for the 2068 and the CAI for the ZX-81. (By the way AERCO refunded my money with interest after 8 months of no delivery on their RS-232c interface.) This is printed on the Brother EP-44 with TASMAN RS-232.

Sincerely,

Bob

BOB HOWARD. WA6DLI

LIST.

JANUARY, CT. 06816

January 17, 1985

Dear Paul, I cannot let another day go by without thanking you for sending the Spectrum ROM so quickly. Well, yes - it did arrive in time for Christmas. I had ordered it as a surprise gift for our youngest who enjoys his 75 2068 box but was getting a little frustrated at his lack of success in getting some of his Spectrum tapes to run on it. You'll never know the joy in his face when he realized what he held in his hand. We filled the ROM in place in no time at all and he's been as pleased as punch ever since.

His main interest right now is in games, of course, and you might be interested to know that the following is a list of Spectrum games that he runs without problems

AVACON	(Adventure)
THE HOBBIT	(Adventure)
MANIC MINER	(Game)
JET SET WILLY	(Game)
GIANTS REVENGE	(Game)
ATAC ATAC, and.	(Game)
SCUBA DIVE	(Game)

(A GOOD SET)
STARTER

Also a copy of the monthly "magazine" 10/48. I have others for him - but that's for his birthday in February.

My own 75 2068 is in to Timex for repair just now but when it is returned I would like to fit a Spectrum ROM in it. I would also like to become a member of LIST. Please sign me up for a year's membership, starting with January 1985 (or should I say February), and send me another Spectrum ROM. My check for fifty dollars (\$50.-) is enclosed, dated on \$12.- for membership and \$18 for the ROM.

I don't know that I can make any of the meetings, but from what I have seen of the magazine I shall get a lot out of it, and can probably contribute something as well.

Thanks,

Bob Howard

BUY IT - SELL IT?

(OR JUST TELL IT!)

LIST Group
P.O. Box 438
Centerport, N.Y. 11721

Dear LIST:

I am an owner of a Timex 2068 and I am interested in selling my system. I would like to know if there is any way you can hook me up with potential buyers in your users group, such as via group meetings or a group publication? I would be very grateful for an assistance that you can offer me. In addition to the 2068 I have:

an Alphacom 32 printer;
a Timex 2020 Tape Recorder;
a Commodore Joystick #1311;

I also have the following software on cassette:

Z80 Assembler;
Flight Simulator, Fun golf,
Budget, Auto Analyser, Math,
and Spelling II: All
by Timex.

I also have the following literature:

- Timex 2068 Technical Manual
- Same Timex/Sinclair 2068 Intermediate/Advanced Guide by Jeff Mazur;
- Timex/Sinclair 2068, 1500 and 1000 Machine language programming and interfacing by Joseph J. Carr;
- Z80 Instruction Handbook by Nat Wadsworth;

The system is 5 months old, in perfect condition and in the original boxes. My price is \$200 for everything. I think it is a good price and I am hoping that at this price it will sell quickly.

I can be contacted at the phone number listed on the front on any weekday after 6PM and any time during the weekend.

Thank you for your help.

Sincerely,
Frank Lewis

Frank Lewis
215-27 48th Ave
Bayside, Queens, N.Y. 11364
(718) 631-7964
1/30/85

SPECTRUM ROMS - \$19.95 (18.00 for List members) includes P & P. LIST Associates, 10 Idle Day Drive, Centerport, N.Y. 11721.

DK'Tronics Light Pen (for Spectrum - works on 2068 buss) \$35.00 (includes P & P) LIST Associates, 10 Idle Day Drive, Centerport, N.Y. 11721.

L.I.S.T.

112 Hillcrest Ave., R. THOMAS BERNER State College, Pa. 16803

January 24, 1985

Long Island Sinclair Timex
Users Group
P.O. Box 438
Centerport, New York 11721

I am a former ZX81 user who has moved on to an Epson QX10. I now have an unused ZX81 with a Timex Sinclair 1016, the basic programming book and some canned programs. The canned programs include Spelling Bee, Algebra I, Algebra II, Super Math and Progger. I also have nine 100-foot tapes from Microsette Co. Some contain back-up copies of the above programs and others contain copies of programs I copied from various books. (Of course, they can be copied over with other programs merely by taping over the gaps.)

I can't get my daughters interested in using the ZX81 and so it has been packed away. When I read about your group in The New York Times the other day, I thought I would let you know what I had in case anyone is interested in purchasing it. I'll listen to any offer, since I'm mostly interested in not seeing the equipment go to waste.

You can write to me at the above address or call me evenings at 814-238-3639. When I'm at my office during the day, the number is 814-243-0544.

Sincerely,

R. Thomas Berner

R. THOMAS BERNER

112 Hillcrest Ave.

State College, Pa. 16803

McGraw-Hill Book Company

1221 Avenue of the Americas
New York, New York 10020
Telephone 212 512-2000

Mr. Steven H. Kaye
Long Island Sinclair Timex
Users Group
P.O. Box 438
Centerport, NY 11721

Dear Mr. Kaye:

I noticed Peter Lewis' "Peripherals" column on January 22nd in the New York Times and was happy to hear of your "spirited defense" of the Timex products. I've enclosed with this letter complimentary copies of our Timex/Sinclair titles. Please share these with your members.

You'll note that Munchers, our most recent T/S book, was published well after Timex's pull out. We were confident that there was a ripe market out there, and I'm happy to say that our sales figures have not been disappointing.

Please feel free to give us a call should you require any information.

BOGLERS: 22 Smart Games Programs (2K to 16K) in Timex/Sinclair BASIC, by Graham Charlton, Mark Harrison, and Dilwyn Jones. [forthcoming]

BEEPERS: 21 Electronics Projects for the Timex/Sinclair 1000, by Gordon Rockmaker and Stephen Adams. [forthcoming]

CRUNCHERS: 21 Simple Games for the Timex/Sinclair 1000 (2K), by Yin Chiu and Henry Mullish.

MUNCHERS: 25 Simple Games for the Timex/Sinclair 1500, by Yin Chiu and Henry Mullish. [forthcoming]

ZX81-T/S 1000 Programming for Young Programmers, by Linda Hurley.

GOSUBS: 100 Program-Building Subroutines in Timex/Sinclair BASIC, by Ewin Gaby and Shirley Gaby. [forthcoming]

Mullish BASICS: A Guide to the TIMEX/SINCLAIR 1000 (1984) (A BYTE Book)

January 23, 1985



Cordially,

Jeff McCartney
Editor

I ordered a computer from
Greenlee Kit from
112 Hillcrest Ave.
State College, Pa. 16803
(800) 489-6039

Cost \$25.00 (the cheapest I have seen)

Service was fast, one week on
a computer and phone order.
Shipped UPS. The price was right too.
The said it's OK to rent there.
Agreed, I have in the newsletter
I would call to verify the
address though.

TYPE: A & J MODEL 2000
STRINGY FLOPPY
PURPOSE: Mass Storage Device
FROM: Knighted Computers
707 Highland Street
Fulton, NY 13069
PH. 315-593-8219

TYPE: A & J MODEL 2000
STRINGY FLOPPY
PURPOSE: Mass Storage Device
FROM: Knighted Computers
707 Highland Street
Fulton, NY 13069
PH. 315-593-8219

For some reason my programs always use all of the 38K RAM on my TS 2068 computer so I looked forward to the arrival of the A & J Micro Drive which I purchased for \$203.00, delivery included. Since then, I have found it could be bought for about \$30.00 less at Phoenix Enterprises, 1788 N. Dupont Hwy., #17, Dover, Delaware 19981 (PH. 302-734-8179). In any event, this Micro Drive and interface is far cheaper than a disc drive and operates at 11,400 BAUD. I can load a 38K program in 45 seconds which is about 1/4 the time it took me using a cassette recorder. You can VERIFY your SAVES, SAVE CODE, SAVE DATA, everything else that you can do with a cassette recorder.

The interface plugs into the back of the TS 2068 and has convenient 18" long ribbon. You can piggyback your Modem and TS 2040 printer onto the interface.

CAUTION, do not connect your TS printer to the edge connector on top of the interface. Apparently, this port was meant for a Centronics printer and requires additional hardware to work (See Page 5, TSS NEWSNOTES DEC. 1984). The A & J Manual is easily understood, however, it does not tell you anything about the printer port. You can modify your programs in less than a minute to utilize the Stringy Floppy and it does not use any of your RAM. Knighted Computers also enclosed some additional information on how to convert auto start programs as well as Tom Wood's Pro/file so they can be SAVED.

This unit comes with five wafers which have a capacity of 14, 28, 49, 70 and 85K. I prefer the 35' wafers which can store 49K and can be purchased for \$4.25 each. I think someone can run a mini-BBS using the 62' wafer that stores 85K.

The bad news is I could not get the Floppy to work after I installed a Spectrum ROM chip. The Manual does not tell us the source code and maybe someone could figure out how to make this work.

I couldn't help but to compare this Micro Drive with the Stringy Floppy's from C.A.I. Instruments I have been using on my TS 1000 for two years. They are not interchangeable and the Model 2000 does not require you to put a lot of POKE's and USR calls in your program to make it work.

The unit has a 90 day warranty and I would strongly recommend its purchase.

Phil McConaghey, P.E.
Pembroke Pines, FL 33023



After several attempts at
writting this review having been
interrupted by almost every
illness except the plague, I
have finally made it.

The micro drive is a great improvement over the tape recorder. Depending upon where the drive has stopped on the wafer, loading and saving times are cut by 1/2 to 2/3. The method of data storage is still serial, that is, programs are stored one after the other. Up to 9 programs can be stored on any wafer depending upon the wafer length and the program length. Programs can be changed as long as the length of the program is the same and saved back in the same position as it was originally. I found the reliability of the save to be 100% every time.

The system comes as an interface, a drive, 5 wafers of various lengths, a wafer storage folder (business card holder), and an instruction manual. The manual doesn't seem necessary because the operating instructions are so simple.

```

NAME      "set program name"
NAME      "set program name" LINE $
NAME      "set pn DATA var()"
NAME      "set pn DATA vars()"
NAME      "set pn CODE m.n"
NAME      "set pn SCREEN$
LOAD      "ppn"
VERIFY    "ppn"
IMAGE     "ppn"

```

* within "" means the number
of the program on the waiver 1-9.
pn = program name.

The program name must be 7 characters or less. One problem occurred using this system. In Tasword II if you save your text the program asks you for the name of your text so that the text can have a name to be stored under. The name is input to a string variable:

SAVE as CODE m,n

On wafer this would be:

SAVE "03,03" CODE 0.0

Which doesn't work. So, you must break Tasword II at this point and type SAVE "ex.program name"CODE m,n to save the text on wafer.

The wafers themselves are marvels. They are small and compact and have a sliding dust cover to protect them that must be closed in order to be able to insert them into the drive.

disk drives so compare the micro drive to them all from what I have heard the micro drive is slower than some and faster than others. All in all if you have had tape recorder problems or you just wish for something better, then this is one way you should consider.

Editor's note: Just at presstime we recieved a letter from Kurt H. He too, has reviewed the A&J, and has a quite different opinion of it. Our advice is to wait until you read his comments, unless you must have a better storage device, now.

CLACKAMAS COUNTY AREA T/S
USERS GROUP

Technical Report:

ZX SPECTRUM MODIFICATIONS TO U.S.A. STANDARDS

While I was on a business trip in Europe last December, I purchased a ZX Spectrum computer. No, I'm not tired of my TS 2068, but my first love is my soldering iron and a heap of electronic components with a burning desire to experiment with these electronic marvels we call computers.

The TS 2068 and the ZX Spectrum are closely related in design, however, there are physical and electronic differences between both computers. Many European publications provide a store of add-on, build your self hardware articles to enhance the Spectrum, but NOT the TS 2068. My Spectrum will now become a test bed for building Spectrum hardware, insure that the hardware functions per specifications, then modifying the hardware to operate with the TS 2068.

This article is dedicated to those individuals who have a Spectrum or intend to purchase one and want to get the most out of it - to operate on 110 VAC with out a step-up transformer, convert the PAL decoder to operate on NTSC video standard for color operation and add a composite video output for your monitor.

POWER SUPPLY CONVERSION - 110 VAC

The original Spectrum power supply module requires 220 VAC at the primary and outputs approximately 9-10 VDCt. Two options for modification can be considered:

1-Rewind the original transformer primary winding to operate at 110 VAC or adding additional windings to the secondary to up the output voltage using the original primary windings. The transformer design allows fairly easy rewinding of the primary or secondary, but it is work.

2-Remove the original transformer and replace it with a commercial 110 VAC, 18 VAC Center Tap transformer.

I chose option two because I had an 18 VAC CT transformer on hand that fit into the Spectrum power supply case. The reason an 18 V CT transformer was selected is that a 9-10 V transformer is pretty hard to come by and by cutting the transformer center tap and paralleling both 9 volt windings with proper phasing, the voltage is 9 volts with the operating current doubled. Also the original power supply rectification and filter assembly can still be used without modification.

The first step in this operation is to remove the power supply case top by removing three (3) Phillips head screws. Remove the case top and set aside with the three retaining screws previously removed. Carefully remove the transformer with the filter assembly and both input and output cables. Measure the transformer core (metal laminations) for height, width and length and record these measurements. I used an old (approximately 3 years old) Radio Shack transformer, however I am not sure that it is available. A visit to any electronics TV Supply house will provide you with the necessary transformer. Ask for an 18 Volt Center Tap, 1 Amp Filament Transformer and

measure it so that what you buy will fit the case. Surgery on the transformer first begins with removal of the mounting frame. Set the transformer on your work bench upside down and pry up the four (4) retaining tabs on the bottom of the transformer core. With a common screwdriver (flat blade), insert the blade between the mounting frame and transformer core and apply a prying motion until the frame has exposed both sides of the transformer core. Remove the frame from the core and trial fit the transformer into the power supply case. If the fit is a little loose, a strip of foam tape (weather stripping) will snug things up at assembly time.

Remove the transformer from the case and locate the secondary side. This is the side with either two green leads and one lead with stripes or three (3) solder lugs. Using a sharp knife (X-ACTO, #11 blade) or razor blade, using light cutting pressure, cut a slit from top-to-bottom at the center point on the transformer secondary side insulation. Carefully pull both sides of the cut tape towards their respective sides which should expose three copper wires either terminated to lugs or wires.

Using a low wattage soldering iron, desolder the center tap winding from a lug or wire. Examine the copper wire tap; it can be either a loop or two separate wires. If it is a loop, cut the loop and if it is two wires, separate them. Cut two small strips of tape, any kind, and place one strip on one of the center tap wires. This is for identification purposes only to properly phase both secondary windings which we will parallel. Using an ohm meter or continuity tester, connect one lead of the test instrument to the CT lead with the strip of tape. The other test lead is touched to either or both lugs/wires to locate the mating lead of the CT lead with ID tape. Now, follow this carefully, place the other strip of tape on the lug/lead which did NOT indicate continuity. Connect both taped wire ends together, remove both strips of tape and solder these leads together. Connect the remaining two leads together and solder these as you had soldered the others.

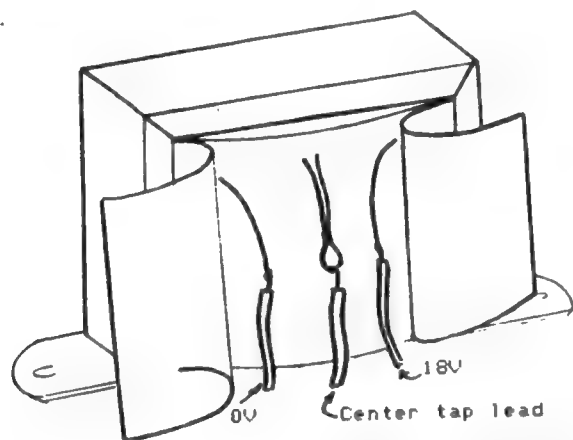
Before going further, the transformer output voltage must be tested for a voltage and correct phasing. Connect a two wire cable with a proper 110 VAC connector to the transformer primary. The primary side should state 110 VAC or have two black wires attached to it. Insulate these connections to avoid any contact with the line voltage. Set your Voltmeter function switch to AC and the range switch to 25-50 VAC. Plug the line cord into an AC wall outlet and touch both secondary connections with the voltmeter probes. If the voltmeter is reading 9 VAC or higher then all is well. On the other hand, if no voltage is present, then remove the line cord from the wall socket, desolder the secondary connections previously made and switch secondary leads. Repeat all previous steps until proper AC Voltage is obtained.

Attach two, 2" leads to the secondary contacts and solder, then place some insulating tape over the exposed secondary leads. Place the transformer into the bottom of the case and add

some foam backed tape to it if the fit is too loose.

Desolder the filter assembly circuit board from the original transformer and place in the case next to the transformer secondary. Connect both secondary wires to the filter circuit board in the holes which the original transformer was soldered to. Any wire can connect to either hole for transformer connection. If you wish, the AC line strain relief from the original transformer can be removed and the 110 VAC line cord can be inserted into it for a custom fit.

Set the function switch on your voltmeter to DC and the range switch to 25 VDC. Plug the line cord into the AC socket and monitor the output voltage at the power supply connector. A reading of 9 VDC or greater will be present.



18 Volt Transformer Secondary Leads
Exposed After Opening Insulation Tape

NTSC COLOR OUTPUT

The Spectrum operates on a European video standard called PAL, which means Phase Alternating Lines. PAL provides 625 TV lines as opposed to 525 TV lines with NTSC. The color is automatically corrected at transmission, thus eliminating the requirement for a Tint or Hue control. If we operate the Spectrum without a change in color burst frequency, then the output on a TV screen will be black and white and possibly some diagonal lines. Fortunately, a crystal change from 4.43 MHz to 3.57 MHz is all that is necessary to have the Spectrum perform in color in the USA.

A trip to your local Radio Shack should solve the crystal requirement. Ask for part no. 272-1310, TV COLORBURST CRYSTAL at \$1.69. If they do not have the crystal, any TV or Electronic Supply outlet will have one. Just make sure it is a miniature case, HU-18.

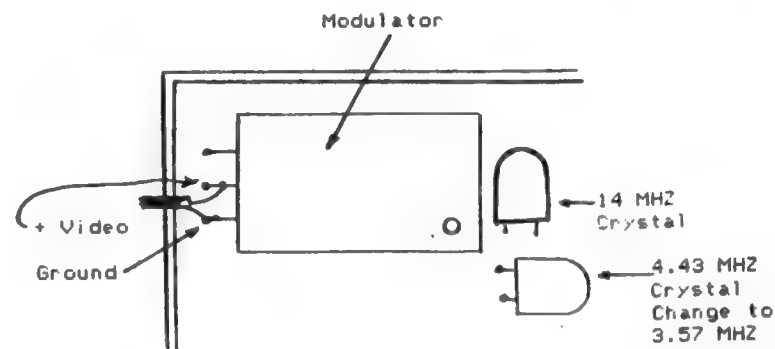
Please note that there are two (2) crystals in the Spectrum computer. A 14MHz crystal operates the system clock and should not be removed or replaced with a crystal of another frequency. The PAL crystal, 4.43 MHz is the one to replace.

Open the Spectrum case by removing five (5) Phillips screws on the case bottom. Carefully open the keyboard section of the case and locate a Phillips screw approximately center on the PC board. Remove this screw and lift out the PC assembly with the keyboard still attached. If you are careful, you will not have to remove the keyboard case section.

The 4.43 MHz crystal is located next to the TV RF Modulator. Insure that you have located the right crystal as the clock crystal shares the same approximate location. Heat up your soldering iron and grasp the 4.43 MHz crystal with two fingers. Disconnect the soldering iron from the AC line and quickly heat up one crystal lead and gently pull with a slight twist at the crystal. Repeat the previous step until the crystal is removed. Note: The soldering iron will not zap any semiconductor within the crystal circuit with a static charge if disconnected from AC. Plug the soldering iron back into the AC line to build up heat. Insert the 3.57 MHz crystal into the PC board using the same holes as the crystal you previously removed. Again, disconnect the soldering iron and quickly solder both crystal leads to the PC board. Clip off both leads of the crystal on the underside of the board. Place the PC assembly with keyboard into the lower case.

Attach a cable to the modulator jack and the other end to the UHF lugs on a TV set. The approximate channel should be between 30 and 36. Plug in the modified power supply and turn on your TV. Rotate your channel Select switch until the Sinclair copyright message appears on your TV. If you do not wish to add a Video Monitor output to your Spectrum at this time, then disconnect power and the TV cable and reassemble the computer case.

NOTE: My Spectrum did not have a trimmer capacitor in the crystal circuit. If yours does and the image on the TV screen appears poor, then you may want to attempt to adjust the trimmer to peak the picture.



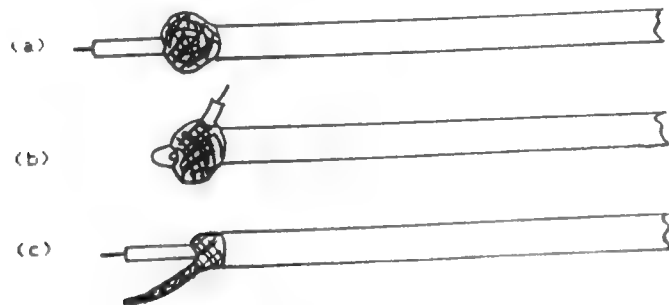
Colorburst Crystal Change & Composite Monitor Input

COMPOSITE VIDEO MONITOR OUTPUT

Obtain an 8" length of 50-75 ohm miniature video cable and prepare both ends of the cable as per diagram. Solder a plug or jack which will mate with your monitor cable to one end of the 8 inch cable. Locate the RF Modulator and mark the computer case bottom between the aft two (2) Modulator leads which terminate into the PC board. Remove the PC board from the case and using a 3/16 inch round file, rout a slot in the case edge only large enough for the monitor cable to exit the computer. Blow out any chips and dust from the case and replace the PC assembly back into the case bottom and secure with the screw previously removed. Solder the center conductor of the cable to the center lead of the Modulator and then solder the shield lead to the aft lead of the Modulator which is signal ground. Attach the Composite Video Monitor lead from your monitor to the composite Video output cable from the Spectrum. Apply power to the Spectrum and the monitor and observe the Sinclair copywrite message on the monitor screen. Remove computer power and replace the five (5) screws previously removed.

The instructions for the three modifications outlined above took longer to prepare than modifying the Spectrum. I hope you feel they were well worth the effort. I do.

.....Bob Gilder



Video Cable Preparation

Strip off approximately one inch of insulation from both ends of video cable to expose shield on each end.

Push shield back towards center of cable. (a)

Using a sharp tool (ice pick, etc.), open the shield and push down on the shield at the hole.

Carefully work the sharp tool under the center conductor and with a prying motion, push the wire through the hole in the shield. (b)

Pull the wire all the way out.

Twist the shield to form a "pigtail" wire for ground. (c)

Strip off approximately 1/8 inch of insulation from the center conductor.

Repeat steps for the other side of cable; trim wire and shield ends to mate with mating jack for composite video cable; tin ends and solder one end to jack and the other end to modulator.

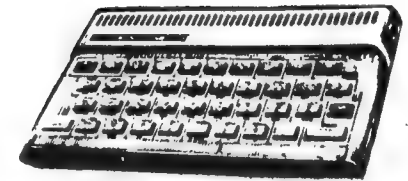
MISCELLANEOUS

Address Change

Sinclair Research, whose ZX Spectrum+ was featured in the December BYTE What's New, has relocated. (See page 435.)

The new address is Sinclair Research, Berkeley Square House, London W1X 5LB, England; tel: 01-499 2666; Telex: 265212.

FEBRUARY 1985 • BYTE



It's Show Time! Here are some upcoming (and one passed) computer shows. Do we have a volunteer who would like to represent LIST?

NEW YORK AMATEUR COMPUTER CLUB
TRENTON STATE COLLEGE -FESTIVAL
FLEAMARKETS

Feb 16 -
Apr 20/21
May 29/31
June
Oct 20

Greenwich Village
Trenton, N.J.
Madison Sq. Garden
Meadowlands Hilton
Uniondale

This chart was sent in by Mad Hacker (he calls himself), a special no prize will be awarded to the member who correctly identifies it's purpose.

Blue = 1
Red = 2
Mag = 3
Green = 4

	0	1	2	3	4	5	6	7	8	9
A	1334	1341	4321	2231	2142	3321	3221	2121	4211	3311
B	2141	4133	3244	4232	2331	2432	3121	2141	2413	2343
C	1144	4243	4232	2431	3121	3232	1424	4233	3421	2411
D	2434	3422	4332	1321	1331	4321	3443	3244	2422	1242
E	4143	1344	4322	4433	3141	3442	3143	2121	4221	2114
F	2322	2219	2124	3432	3133	2242	2241	1233	2223	4223
G	1314	2133	2323	4414	1231	3142	2222	3242	2232	3122
H	4221	3414	2114	2242	1142	3232	3234	2411	4133	2423
I	2314	2233	1343	2113	2342	2321	3122	1113	3412	1443
J	1324	1342	1121	2313	1221	3112	2311	1441	2322	3421
K	1131	3223	4343	2314	2324	3133	2122	2213	4212	3142
L	1424	1234	2232	2201	2413	1321	3314	4214	3443	2222
M	4141	3322	1243	2322	1312	1131	2314	3331	233	3422
N	1322	2124	2412	2323	2412	3111	3314	3342	3134	3123
O	1112	1321	1242	3443	3112	2432	2243	2411	1133	3133
P	1311	4343	2242	4331	224	2412	3434	4142	2334	244
Q	1113	2441	1243	3113	1144	2333	2324	4111	1233	4211
R	2212	2112	2422	1132	1314	2111	3322	2411	3443	2423

COMPARISON CHART

Here's a sample from the Introduction Cartridge which comes with the microdrive /I-F 1 pack.

[illegible]

The *CAT command allows you to obtain an extended CATALOG of a cartridge.

e.g., *CAT #1 (note the #)

The list of files will be displayed, with their type and approximate length. The catalog may be directed to a stream.

e.g., *CAT #3,1 would print it on the ZX Printer. (note - only a maximum of 42 filenames are printed with *CAT #)

To catalog a cassette, enter *CAT "c" then PLAY the tape. Filenames, types and lengths are printed. Press SPACE to halt the printout. Again streams may be used, e.g., *CAT #3,""

These extra commands are now available to be used.

DEMO

P.O. BOX 438
CENTERPORT, N.Y. 11721-0438

3/85

A CROSS-CORRELATION OF THE SPECTRUM ROM VERSUS TS2068

Part 3

Copy Right ©, Aug. 1984. By N.A. Pashtoon

Now that SYNTAX has finally published the ROM Atlas in their Nov. issue, for those of you who subscribe to SYNTAX, you are already in possession of the whole Atlas. For the benefit of those of you who are not subscribers, I will continue the series.

The organization of the Atlas is based on ascending addresses of the Spectrum ROM. The labels and names are those used by Ian Logan and Frank O'Hara in their book, "The Complete Spectrum ROM Disassembly". The Atlas then provides the corresponding ROM addresses for the TS2068. The final column provides all the names and labels that I could lay my hand on in Corcoran and Branigin's "Timex 2068 Technical Manual".

To facilitate the software conversion process, it is suggested that you try your hand on converting a few published MC programs in British magazines. Most often the conversion process is as easy as looking up the Spectrum ROM addresses in the Atlas and converting them to the TS2068 addresses. In the beginning, at least stay away from "interrupt driven" software. We will explain the conversion process for that type of software in the future. Commercial software conversion is of course a different story. The complication arises from the fact that beside not having any documentation as to the function and entry points to various routines, you also have to remove layers of protection. In the future an attempt will be made to explain the various protection schemes, and how to break into a protected software (mind you, strictly for educational purposes and to be able to fully utilize our machines).

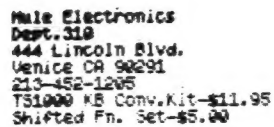
Another factor, which can complicate matters is if the Spectrum

ROM ATLAS

COPY RIGHT N.A. PASHTOON, © AUG. 1984

SPECTRUM		TS 2068		SPECTRUM		TS 2068	
LABEL, NAME	ROM Addr	LABEL, NAME	ROM Addr	LABEL, NAME	ROM Addr	LABEL, NAME	ROM Addr
IN-ASSIGN	21B9 2363	ERRH	21D4 237E	ALPHANUM	2C98	ALNUM?	3046
REPORT-H	21D4 237E	NOTKB?	21D6 2380	ALPHA	2C9D	ALPHA?	304B
IN-CHAN-K	21D6 2380			DEC-TO-FP	2C9B	STKSUM	3059
CO-TEMP-1	21E2 238B			NUMERIC	2D1B	DIGIT?	30D9
CO-TEMP-2	21E2 238C	GR-COL	21F2 2396	STK-DIGIT	2D22		30E0
CO-TEMP-4	21FC 23A6	COLIM	2234 23DE	STACK-A	2D28	STK-A	30E6
CO-TEMP-7	2234 23DE	COLOR	226C 2416	STACK-BC	2D2B	STK-BC	30F9
CO-CHANGE	226C 2416			INT-TO-FP	2D3B	INIT	3100
CO-TEMP-C	2273 241D	HIFLSH	2294 243E	E-TO-FP	2D4F		3100
BORDER	2294 243E	BORDER	2294 243E	INT-FETCH	2D7F	LDDE	313D
****	****	NEWDEV	24D2	P-INT-STO	2D9C	STDE-U	314A
****	****	PASSEN	25B9	INT-STORE	2D8E	STDE-S	314C
PIXEL-ADD	22AA 2603	SCRNBL	2603	FP-TO-BC	2DA2	FP2BC	3160
POINT	22CB 2624	F-PNT	22DC 2635	LOG(2+A)	2DC1		317F
PLOT	22E5 263E	PLOT	2307 2660	FP-TO-A	2DD5	FP2A	3193
STK-TO-BC	2314 266D	GETXY	2320 2679	PRINT-FP	2DE3	OUTPUT	31A1
STK-TO-A	2320 2679	CIRCLE	2382 26DB	CA=10*A+C	2F8B		334A
CIRCLE	2382 26DB	DRAW	247D 27D6	PREP-ADD	2F9B	SUMSLD	335A
DRAW	247D 27D6			FEICH-TWO	2FBA	SHIFT	3379
CD-PRMSL	2487 2810			SHIFT-FP	2Fdd		339C
DRAW-LINE	2487 2810	DRAW-L	2487 2810	ADD-BACK	3004	SUB	33C3
SCANNING	24FB 2854	EXPRN	2530 2889	SUBTRACT	300F	ADD	33CE
SYNTAX-Z	2530 2889	INTPT?		addition	3014	MULT	33D3
S-ATTR-S	2580 28D7	F-ATTR		HL=HL*DE	30A9		3468
S-U-PLUS	25AF 296D			PREP-N/D	30C0		347F
S-LETTER	26C9 2A87			multiply	30CA	ERR6	3489
S-FN-SBRN	27BD 2878			division	31AD	DIVIDE	356C
S-SCREENS-S	2535 288E			REPORT-6	31AF	TRUNC	356E
S-RND	25F8 29B6	RND	2627 29E5	truncate	3214		35D3
S-PI	2627 29E5	F-PI		RE-ST-TWO	3293	TIMES	3052
S-INKEYS	2634 29F2	F-INKEY		multiply	30CA	FLOAT	3489
FN-SKPOVER	28AB 2C69	NXT-HL		RE-STACK	3297		3656
LOOK-VARS	28B2 2C70	FIND-N		FP calculator start:	32C5		3684
STK-F-ARG	2951 2D0F			CALCULATE	32C5	CTRO	3684
STK-VAR	2996 2D54	GET-EL		fp-calc-2	33A2		371A
SLICING	2A52 2E10	SLICER		TEST-5-SP	33A9	ROOM?	3761
STK-ST-0	2AB1 2E6F			STACK-NUM	33B4	STK-H	3768
STK-STO-1	2AB2 2E70	PSHSTR		MOVE-FP	33C0	RAHNO	3773
STK-STORE	2AB6 2E74	PAEDCB		STK-DATA	33C6		377F
INT-EXP-1	2ACC 2E8A			SKIP-CONS	33F7	ARRAY	3785
DE, (DE+1)	2AEE 2EAC			LOC-MEM	3406		37C5
GET-HL*DE	2AF4 2EB2	LET		get-mem-0	340F		37CF
LET	2AFF 2EBD			stk-zero	341B		37DA
L-ENTER	2BA6 2F64			st-mem-0	342D		37EC
L-ADD-S	2BAF 2F6D			EXCHANGE	343C		37FB
L-STRING	2BC6 2F84			series-06	346A		3829
L-FIRST	2BEA 2F88			NEGATE	346E	NEGATE	382D
STK-FETCH	2BF1 2FAF	POPSTR		sgn	3492		3851
DIM	2C02 2FC0	DIM		in	34A5		3864

5



Source of TI KBs
Radio Shack
Anywhere USA
Check availability

Arnold Co. (TX)
214-578-229
5.95

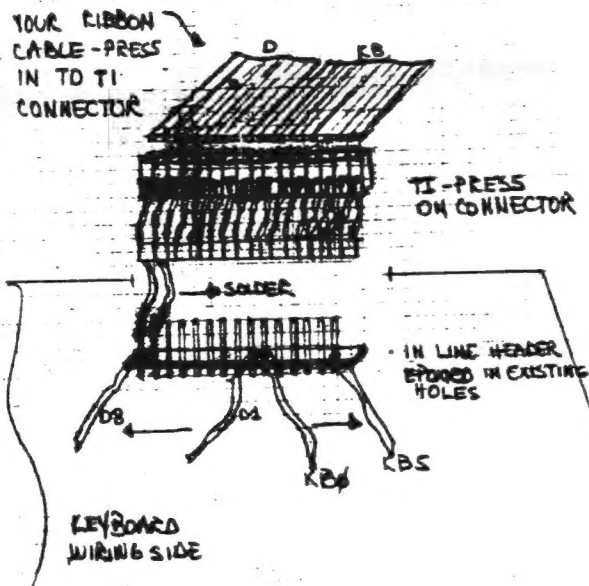
American Design Components (NJ)
201-939-2710
\$5.95

Sabet Elect. (TX)
214-234-8932
\$3.50

Lolin Elect. (TX)
214-234-8032
\$3.50

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FIG 2.



List
Group

ADAPTING THE TI KEYBOARD TO THE TS1000

This article is for those lucky people who have delayed, hesitated or just have not gotten around to wiring up their "big" keyboards.

In the last few months Texas Instruments has dumped on the surplus market a huge quantity of new components designed for use with the now defunct TI 99/4, including power supplies, RF modulators and TMS 9918 chips. One of the prize finds from this lot is the 48 key keyboard which can be purchased from numerous vendors; prices range from \$3 to \$10 (a list of vendors is provided for you at the end of the article).

The hardware of the TS keyboard system is quite straightforward. It consists of 40 normally open switches and eight diodes arranged in a matrix pattern. The status of the switches is periodically read by the ROM by an IN instruction to port FEH. These details, however, are not of concern in wiring up your keyboard; the object of the task is to duplicate the wiring of the membrane pads.

Preparing the Keyboard

The steps involved in transforming your keyboard from TI to TS follow. The instructions are the same for the grey or the black keyboard; they are functionally the same. Do note, however, that the keytops are not interchangeable as their slopes are different. You can also do this project by rerouting traces on the PC board (by cutting and jumpering), but this method can put you in a foul temper in very short order. I chose to start with a clean slate by eliminating all the traces.

Desolder all key contacts (2 Each) on the PC. This job is made easier with a vacuum type desoldering gun from Radio Shack (\$6.95). Desolder and store the very important cable connector TI provides; you will need it later. Carefully pry the PC board off the keys. It will separate cleanly with a little urging. Never mind that lots of little washers have also fallen under the workbench, lost for posterity, you will not need them. The next step is to grind off all the foil and the green protective layer leaving a naked epoxy board ready to hardware to your specifications. Note that the method of attack for this job is dictated by the technology available to you and/or how hard you like to work at things. I used a grinder with a 6 inch wheel passing the board in front of the small cutting surface many, many times. My thought during this process was how much easier this would be with a belt sander. Once the board is stripped you can be proud of yourself for having reversed the work of mighty TI for use on your humble ZX. Don't stare at it too long; the main part of the conversion is yet to come.

Wiring Your Keyboard

First decide where you will locate the mechanical shift lock key. This will not be possible once wiring is underway. I used 30AWG wire wrap wire successfully for the whole project. I suggest you get as many colors as you can afford. FIG 1. is a diagram from the MULE Electronics Keyboard Symbol Kit. The diagram shows all

necessary connections. You can daisy chain rows or columns if you use bare wire. This saves a considerable amount of time over cutting small lengths of wire as you will have to for the rest of the project. Once the matrix is wired, you are ready for your bonus; shifted function special purpose keys. The rule to remember in wiring these is to evaluate the shortest route to a particular Address or KB line, before you take soldering gun in hand. It's beyond the scope of this article to detail the methods used to obtain shifted functions or repeat keys. Articles in Sync, Syntax and TS Horizons have covered these topics. The MULE kit also covers the subject thoroughly, providing diagrams on how to obtain all of the shifted functions. This is one area where you can customize your computer to put it into a category by itself. I have wired 4 special purpose keys and find that I use them constantly to increase the utility of data base and word processing programs.

Connecting Your KB to the Computer

There is no easy single way to bring keyboard and Address lines from your new keyboard to the computer chassis. The connector provided (remember I asked you to save it) by TI has 15 slots; it is a press-on type of connector. Standard ribbon cable can be push fitted into these slots with the help of a screwdriver. Once this is done you have a connector with a long stretch of ribbon cable. How do you get this secured to your newly rewired keyboard? One way is to epoxy a strip of a single in-line IC spacing header to the KB and to solder your cable/connector assembly to this (See Fig.3). The header material can be bought in a strip and cut to the 15 position size to fit into predrilled holes already there. Radio Shack no longer carries this material but it can be bought from a variety of other sources.

Now, on to the last bit of wiring. To finish the project you must bring your KB and Address lines to your new header. The thing to remember here is that your 5 KB lines will be on the left and your 8 ADD lines will be on your right on the finished project. If you are going to retain the keyboard connectors on your computer chassis you will have to make a one sided .1 spacing edge connector to fit into the TS keyboard connectors (See FIG 2.). You can use the Zebra C112 45 pos male card edge connector (\$2.50) cut down to size (8 and 5 slot) and with the back traces buffed off to fit into the KB connector slots. Of course the other alternative is to directly wire the keyboard to the chassis.

The last part of the project is to install your new keytops from the MULE kit. These high quality plastic symbol tops go on easily, look professional and seem to last forever. Comprehensive instructions are enclosed with the product. The symbols on the sides of the TI keys can be sanded off easily with 500 grit while you are doing your keytops.

By now you are either totally confused or the proud owner of a newly converted TS/TI keyboard. For the adventurous few who absolutely demand a numeric keypad, this too is possible. You must buy a second keyboard to scavenge the keys. If you would like to do this project, send S.S.A.E. and I will send you a drilling

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NEW BARUT

routines you are converting, utilize any cassette related programs in the ROM. In TS2068, all cassette related routines, like LOADING from tape, SAV(E)ing etc. are located in the EXROM. To use any of them, you have to activate the bank switching logic to switch-in the EXROM (and switch-out the HOME ROM), perform the desired task and then deactivate the EXROM. The "header" reader in the Nov. '84 issue of LIST is an illustration of the use of routines in EXROM.

The tape headers are seventeen bytes long, supplying info. on program length, name, etc. (Please see the TS2068 Tech. reference manual). In both Spectrum and TS2068 to use the tape loading routines the following parameters are set up:
 Register A 0 to load header, or 255 to load program
 Carry flag SET to load data, RESET to verify data
 Register IX the address of the mem. loc. where you will start writing.

The Specrum program to read the header is short and sweet, and will look as follows: (We are loading the 17 bytes starting at 32768=8000H)

```
BEGIN LD DE,0011 ( dec. 17)
      XOR A
      SCF
      LD IX,8000 ( dec. 32768)
      CALL LD_BYTES(0556)
      JR NC,BEGIN
      RET
```

In the TS2068 version, not only will we have the above code segment, but also we have to successfully switch banks, enable the EXROM, do the loading, and then switch the banks. In the following routine the system variable loc. 5C81H(NMIA) is used for temporary storage purposes to make the code position independent.

```
SCF
LD A,00
LD IX,8000 (dec. 32768)
LD DE,0011 (dec. 17)
DI
PUSH AF
IN A,(FF)
SET 7,A
OUT (FF),A
IN A,(F4)
LD (5C81),A

LD A,01
OUT (F4),A
POP AF
CALL R_TAPE
LD A,(5C81)
OUT (F4),A
IN A,(FF)
RES 7,A
OUT (FF),A
EI
RET
```

In the next issue of LIST, an example routine for the disassembly of the EXROM will be shown.

RESPONSE FRAME

(On MICRO DRIVES)

Recently I received a long letter from Mr. John Olliger, concerning the article in the Feb. '85 issue of LIST titled "MICRODRIVES UPDATE". The letter is very interesting to read. Since it was addressed personally to me, I am assuming it was a personal letter, as such we will not reprint it in LIST in order to honor the privacy of personal correspondence. We will present the general technical thrust of the letter, so LIST members will benefit from the issues raised.

Those of you who are new to ZX computers, may not be familiar with John. John has been a designer of ZX hardware since the beginning. All of us who have used any peripheral designed by John can attest to its highest quality, and the extremely (and manual) support available from him. His series of articles in SQ are a collectors item, and are still a delight to read. Recently he finished a prototype of a disc drive interface for the TS2068, and Ray Kingsley will be developing the software (the best software and hardware designer combination). In other words, John is an expert in ZX peripherals design. So it is good to hear from you, John.

In the following I will itemise my impressions and the issues raised. 1) From reading the letter carefully my impression is that John does not disagree with my experiential methodology or the conclusion on timing requirements that I have reached. So let us restate the problem at hand: The reason that the microdrives may not work with a TS2068 is that the emulator EPROM grabs the bus too early, or equivalently, the Int.1 is too late in grabbing the bus.

2) Assuming the above identification of the problem to be true, the following are the constraints put on the design of the twistor:

a) No modification inside the computer are allowed.
 b) No modifications inside the Int.1 are allowed.
 3) John does not like the installation of the four caps. on "timing critical" address wires A3, A0, A9, and A10. The analogy he has drawn is that he likens this to a leaking car radiator where the owner constantly pumps a fixed amount of cold water to maintain the engine cool.

In my article I have called the solution a "dirty and fast" solution, and I had called the value of the caps. excessive. As such I don't think we have a disagreement here. Based on the above...

fact that there were other User Groups who had tried to tackle the problem for months, without success. I believe the "dirty and fast" solution is still better than no solution at all. We in our group will be looking for a better solution. We sure like to hear from other groups, and individuals who have devised a better and elegant solution than ours. By the way, since the Feb. issue the design has been tested on numerous computers, both by us and another User Group, and it works.

4) In a long paragraph, John explains what the access time spec. for EPROMS mean. Namely that, say, 300 nS spec. is a guaranteed spec. by the manufacturer and the device could have an access time of say, 200 nS. We were fully aware of this. As a matter of fact, the first diagram in my article, where an experiment is run to simulate longer access time, I used a 300 nS Intel EPROM, which I had borrowed.

5) The use of the word "feedback" for the RMCS connection to the EMU-1 and for that matter the connection itself is criticised. As for the connection, it exactly simulates the connection made inside a Spectrum. As mentioned in my article, and emphasised by John, the connection to BE with suitable logic is more elegant. The problem I see in the present situation is that such an interconnection introduces an estimated 30 to 40 nS overhead penalty making the situation worse in this design.

As for the use of the term "Feedback" being my invention, I was describing the mechanism for interaction between two black boxes. Electrically the description is accurate, and I stand by the use of the word. Though, I realise that the use of the word is not such in vogue with digital and micro processor system designers.

6) John has taken me to task for saying that "show me a microcomputer which does not use caps....". As counter examples he mentions VIC20, C64, LM50, TRS80-1 etc. I realise that my statement was too sweeping a generalisation, so let me retract it. My experience on the low end has basically been with the ZX line of computers and peripherals. With ZX peripherals (both British and American, made by impression has been that the dirty and fast solutions were almost a rule, and I can cite many examples. John mentions that the caps on the 2040 printer were for FCC approval. If John's info. is coming from the same source as mine (it was written in one early SYNTAX, SQ or SINC), then frankly we don't know this for a fact. In another words, was this FCC story a fact or fiction? I personally do not know.

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